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Abstract

PURPOSE: To realize the high purity ALE growth of chloride and a simple raw-material carrying method in an MO-ALE method by repeating a step wherein the chloride of a group III element which is obtained by the reaction of an organic metal compound and hydrogen chloride is carried into a substrate crystal region with a carrier gas and a step wherein a group V raw material is carried into said substrate crystal region.

CONSTITUTION: As a group II organic metal raw material 11, Ga(CH₃)₃(TMG) is used. As a group V raw material 16, AsH₃ is used. The mixed region of the TMG and the hydrogen chloride is heated to 650 deg.C. The region of a substrate crystal 15 is heated to 450 deg.C. the TMG and the hydrogen chloride gas 12 are mixed at the high temperature part in a reacting tube 13. The result is carried into the region of the substrate crystal 15 as GaCl with an H₂ carrier gas. The GaCl is adsorbed in the upper part of the substrate crystal. Thereafter, the supply of the GaCl and HCl gas is stopped. Then, excessive chloride in the reacting tube is purged only with H₂ gas. Then, AsH₃ of the group V raw material gas 16 is fed into the reacting tube. A GaAs layer is grown by the reaction with the GaCl which is adsorbed in the substrate crystal. Thereafter, the excessive AsH₃ is purged from the substrate region only with the H₂ gas. The atomic layer epitaxy(ALE) growth advances by repeating these steps.